

## Claims:

1. A pen maintenance system, comprising:
  - a pen having a printhead and a chamber for holding ink;
  - a supply of ink;

5           a sensor for monitoring changes in the amount of ink in the chamber;  
and

              a pump connected to the chamber for changing the pressure in the chamber to selectively draw ink into or expel ink from the chamber.

10          2. The pen maintenance system of claim 1 including an ink supply reservoir separate from the pen.

              3. The pen maintenance system of claim 1 wherein the pump is selectively placed in fluid communication with the chamber.

              4. The pen maintenance system of claim 3 wherein the pump is for decreasing the pressure in the chamber.

15          5. The pen maintenance system of claim 3 wherein the pump is for increasing the pressure in the chamber.

              6. A method for maintaining a pen, comprising the steps:
  - (a) connecting a pump to a pen having an ink chamber; and
  - (b) operating the pump to modify the pressure in the chamber to thereby modify the amount of ink in the ink chamber.

20          7. The method according to claim 6 including the step of detecting pressure in the ink chamber to generate a chamber pressure value, and comparing the chamber pressure value to a predetermined pressure value.

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8. The method according to claim 7 wherein the step of detecting pressure in the ink chamber includes the step of providing a sensor in the ink chamber.

9. The method according to claim 7 wherein operation of the pump is initiated when the chamber pressure value differs from the predetermined pressure value by a predetermined value.

10. The method according to claim 6 including the step of detecting a fluid level in the ink chamber.

11. The method according to claim 10 wherein operation of the pump is initiated upon detection of a change in fluid level in the ink chamber.

12. The method according to claim 10 wherein the step of detecting the fluid level in the ink chamber includes the step of providing a fluid level sensor in the ink chamber .

13. The method according to claim 6 wherein operation of the pump causes ink to flow into the ink chamber from an ink source.

14. The method according to claim 13 including the step of fluidly connecting the ink chamber to the ink source.

15. The method according to claim 13 wherein the pen includes nozzles and ink flows into the ink chamber through the nozzles.

16. The method according to claim 13 wherein the pump reduces pressure in the ink chamber to cause ink to flow into the ink chamber through the nozzles.

17. The method according to claim 16 wherein the pump operates until the internal pressure in the ink chamber reaches a predetermined value.

18. The method according to claim 6 wherein the pump changes the pressure in the ink chamber to cause ink to flow out of the ink chamber .

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19. The method according to claim 8 wherein the pump increases the pressure in the ink chamber .
20. The method according to claim 8 wherein the pen includes nozzles and ink flows out of the ink chamber and through the nozzles.
- 5        21. The method according to claim 20 including the step of capturing the ink that flows through the nozzles.
- 10        22. The method according to claim 21 including the step of cleaning the captured ink.
- 15        23. The method according to claim 22 including the step of recharging the pen with cleaned ink.
- 20        24. The method according to claim 6 including the step of moving the pen into fluid communication with an ink supply and wherein the pump causes ink to flow into the ink chamber.
- 15        25. The method according to claim 24 where the pen includes nozzles and wherein ink flows into the ink chamber through the nozzles.
- 20        26. A pen maintenance apparatus, comprising:
  - a pen having an ink reservoir and sensor that detects the amount of ink in the reservoir;
  - an ink supply that supplies ink to the reservoir; and
  - 20        a pump for modifying the pressure in the reservoir to selectively expel ink from the reservoir or to cause ink to enter the reservoir.
- 25        27. The pen maintenance apparatus according to claim 26 wherein the pen includes nozzles, and wherein operation of the pump decreases the pressure in the reservoir to cause ink to flow from the ink supply through the nozzles and into the reservoir.

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28. The pen maintenance apparatus according to claim 26 wherein the pen includes nozzles, and wherein operation of the pump increases the pressure in the reservoir to cause ink to flow through the nozzles and out of the reservoir.

5        29. A pen maintenance system, comprising:

a pen having a printhead and an ink chamber;

a sensor for monitoring the amount of ink in the ink chamber;

a pump fluidly coupled to the ink chamber;

10        an ink supply having a cap defining a seat configured to receive the printhead so as to define a seal between the printhead and the cap;

wherein ink may selectively be expelled from the pen and into the ink supply, and introduced to the pen from the ink supply through the printhead by operation of the pump.

15        30. The pen maintenance system according to claim 29 wherein the pen is selectively fluidly connectable to the ink supply reservoir and the pump is configured for altering the pressure in the ink chamber to either cause ink from the ink supply reservoir to flow into the ink chamber, or cause ink to flow from the ink chamber to the ink supply reservoir.

20        31. The pen maintenance system according to claim 29 including an actuator for selectively moving the pump into and out of fluid communication with the ink.

32. The pen maintenance system according to claim 31 including an actuator for selectively moving the ink supply reservoir into and out of fluid communication with the printhead.